3 Design of the Study and Case Selection

3.1 Design of the Study

A comparative case study design was employed to investigate the remaining research questions Q1-b and Q2 (a-d) (see section 1.21.1). According to Eisenhardt (1989), case study research can be defined as "a research strategy which focuses on understanding the dynamics present within single settings." (p. 534). Following this definition, case study research is often said to be mainly suitable for research seeking to answer “how” and “why” questions (Yin 2003). Case study research is often of a qualitative nature: A limited number of cases -be it organizations, business units, teams, or others- is investigated in depths often by means of observation or interviews, in order to draw a detailed picture of qualitative particularities. According to Yin (2003) several types of case study research can be differentiated: exploratory, explanatory, and descriptive case studies. **Exploratory** case studies are often conducted to define research questions and hypotheses. **Explanatory** case studies seek to link an event with its effects and are suitable for investigating causality. **Descriptive** case studies are often used to illustrate events and their specific context. Each of these types can either study single or multiple cases, and cases can either be investigated in a longitudinal setting – to discover and explain changes within cases over time- or in a comparative setting – to discover and explain differences between cases. The reasons for choosing a case study design for the study at hand are the following:

**Limited availability of cases:** At the beginning of this study only a few ECUs in the Netherlands had appointed EPs. Even among those that had, mostly not more than one or two trained EPs had been appointed. The total number of ECUs that could possibly be investigated was therefore very limited. This naturally favors a case study approach.

**Nature of research questions:** According to Yin (2003), case studies are favorable when “how” or “why” questions are being asked. As described in chapter 1, this thesis explains differences in the professional development of EPs, and it tries to explain under which circumstances EPs can improve organizational performance.

**Nature of event:** Yin (2003) suggests that case studies are favorable when contemporary events are investigated and when behavior cannot be controlled. A different research strategy to investigate past or contemporary events is the use of history. However, an advantage of case studies above history is that a broader range
3. Design of the Study and Case Selection

of data collection instruments can be applied, such as observation or interviews with people currently involved in the event. Experiments are a favorable research strategy if the researcher can control the behavior of the investigated events/people. When conducting the study at hand, however, we had no control over the behavior of doctors in ECUs and ECU management. What is more, the available material is very suitable for the case study strategy and promises to be enriched by conducting interviews and observations.

**Nature of phenomenon:** According to Yin (2003), case studies allow for a holistic study of a phenomenon. In this research, not all of the potentially important variables were known in advance. We hence needed a research design that allowed for an open mind within a given research range.

**Nature of context:** The study and its subject cannot be separated from its context; case specific conditions need to be taken into account (i.e. the use of EPs within ECU).

**Comparative or longitudinal design:** Research questions like ours could very well be answered by conducting longitudinal case studies. Measurements of certain performance indicators could be conducted before and after the occurrence of a certain event (in this case the implementation of a new professional, that is EPs); the results at time t₁ could subsequently be compared to time t₀. This quasi field experimental procedure would, however, require cases that have not been using EPs until the termination of the first measurement and that would start using them directly afterwards, enabling a subsequent second measurement. This “just in time” organizational change could not be found among the potential cases. Besides, organizational changes need time to become effective and tangible results cannot be expected to occur immediately, counteracting a follow-up measurement within the study’s given timeframe. Therefore, we conducted a comparative case study design, which comprises the comparison of cases that differ on certain crucial characteristics. Details about the case selection can be found in the following section.

Case studies are often seen as a synonym for qualitative, “soft” research. Eisenhardt (1989) and Yin (2003) show that case study evidence does not necessarily need to originate from purely qualitative data. Evidence can just as well be based on purely quantitative data, e.g. from questionnaires, or on a combination of qualitative and quantitative data. For this study, a combined approach was followed: Despite the arguments listed above that favor a rather qualitative approach, EPs are expected to
contribute to a calculable benefit for hospitals. Besides, important contingencies of ECUs are of a nature that purely qualitative data might not be able to properly identify. By adding quantitative measures to the concept of qualitative in-depth case studies we draw a picture of each case that is as complete as possible with regard to the relevant characteristics. The completeness of the picture drawn is not just a question of the nature of the data, but also relates to the use of data collection methods: case study research suggests the use of multiple methods (Yin 2003; Meredith 1998; Eisenhardt 1989). Parallel use of several research methods and sources enables what is often called data triangulation, and thereby contributes to enhanced internal validity of the study. Internal validity is especially important for explanatory case studies as it establishes causal relationships between conditions, i.e. a researcher is trying to show that condition/event x lead to condition/ event y. But how can the researcher be sure that no third factor ‘z’ caused y (Yin 2003)? In this thesis, we used a variety of methods and sources for data collection to enhance internal validity (for details see chapter 6). We further tried to contribute to internal validity by applying the following steps:

- We started with a quite open research concept which we further developed according to preparatory conversations with medical and other ECU practitioners. This allowed us to include indicators that we might not have foreseen in the beginning.
- The data collection was designed in a way that the picture drawn on each case was as complete as possible. Once we developed new inference from a case we were therefore able to go back to the other cases’ data and detect possible matching patterns.

Case study research is often criticized for the limited number of investigated cases which is said to limit the generalization of the findings (external validity). There may, however be research questions which cannot -or only within an often unavailable amount of time and other resources- be pursued by quantitative large n research. To explain the difference of possibly expectable generalization between case studies and, for instance, survey research, Yin (2003) puts forward a difference between statistical generalization and analytical generalization. While survey research tries to generalize findings based on a sample that generalizes to a larger
universe, case study research aims at generalizing a particular set of results to some broader theory. In order to enhance the external validity and to "establish the domain to which a study's findings can be generalized" (Yin 2003, p. 34), he describes a number of actions which we tried to pursue:

- We followed the case selection strategy recommended by e.g. Yin (2003), Eisenhardt (1989), and George and McKeown (1985).
- We tried to take possible regional differences into account by selecting cases in the North and the South of the Netherlands.
- External validity within the cases: In order to be able to generalize findings from the employees’ questionnaires (see chapter 6.2), we consulted the ECU management about the representativeness of the respondents’ characteristics. In order to generalize findings from the hospital information system (see chapter 6.1) we used a large number of patient records. In some cases, patient records from only a shorter period were selected (three months); the ECU management was consulted to ensure the representativeness of the data from the selected months. Where large n samples were not available we drew smaller samples according to identical sampling rules (see below).

Despite taking these actions, we do not presume that our findings hold for every Dutch ECU. We argue however that recommendations can be drawn from our findings which might be beneficial to ECUs outside of the investigated cases.
3.2 Case selection

Following Eisenhardt (1989), this section provides information about the case selection. According to the suggestion by prominent authors in the field (e.g. Yin 2003; Eisenhardt 1989; George and McKeown 1985), we base the case selection on two factors: feasibility within the individual hospital and sample variation in crucial categories.

The first factor, feasibility within the individual hospital, was largely determined by the hospitals’ willingness to participate in the study and to provide the required information. Not only did this include the provision of resources, e.g. to release staff members from work for interviews, it also included the existence of sufficient registration data and the hospitals’ readiness to let us access it.

To satisfy the second factor -sample variation in crucial categories- we defined crucial categories. As we investigate the effect of EPs on organizational performance, we naturally need to differentiate between cases that appoint EPs and cases that do not appoint EPs (and staff the ECU rather traditionally with residents and/or interns). The first category is whether EPs are used/ EPs are not used. This distinction, however, proved to be too general. Practice shows that large differences occur between ECUs that use EPs, in terms of the degree of penetration: while some ECUs only recently appointed one or two EPs, others may have replaced nearly the whole medical ECU staff with EPs some years ago. We therefore refined the first category and differentiate between cases in an advanced state of transition towards an EP-based emergency care system and those cases in an early stage of transition. It is important to note that the expression early in this context does not necessarily refer to a time dimension. An ECU may be working with only one EP for a very long time; but if it does not further progress towards an emergency care system which is completely based on EPs we regard this case to be in an early transition.

The second category is ECU within large teaching/ small non-teaching hospital. Differentiation between teaching and non-teaching hospitals is a common typology, which can be found in a number of studies (e.g. Grosskopf et al. 2001, Kelen et al. 2000, Rosenthal et al. 1997). It is based on the assumption that the work situation in teaching hospitals largely differs from non-teaching hospitals. Teaching hospitals also put more emphasis on research, and specialists regard supervision as a regular task in providing training to residents. Residents, doctors being trained to
3. Design of the Study and Case Selection

become specialists, are an occupational group which is mostly absent in non-teaching hospitals and which needs to be provided with training opportunities in teaching hospitals. Teaching vs. non-teaching is hence an important criterion to differentiate among hospitals. Another important criterion is the size of the ECU in terms of the number of patients seen per year. ECUs that need to cope with several tens of thousands of patients per year will need a different organization than ECUs which are only visited by a few thousand patients per year. As the size of the ECU often goes along with the size of the hospital as a whole, we will in the following refer to the size of the hospital rather than to the size of the ECU. Although this terminology might not be completely accurate, it contributes to the readability of the thesis. The hospital size and the teaching situation often go together. Therefore, we define large teaching hospitals as hospitals whose ECU sees more than 15,000 patients per year and which have specialist training programs for residents. Small non-teaching hospitals, in contrast, are defined as hospitals whose ECU sees less than 15,000 patients per year and where no independent specialist training takes place.

Assigning the described criteria to a scheme yields a six-field matrix (see Table 3.1). In this study we investigate one case per field. In one field, EPs are not used/large teaching hospital, two cases are investigated due to the fact that one of them is an university hospital, which has different foci than “regular” teaching hospitals. Table 3.1 illustrates and summarizes the criteria of the case selection.

The participating cases were approached in different ways. One hospital became a case in this study based on a related pilot study that had earlier been conducted within the case. The pilot study was originally meant to reveal longitudinal knowledge on the benefits of EPs, but it could not be completed. The existing contacts, as well as collected data, were made available for usage in our study. Another hospital which suited the selection criteria was also contacted on the basis of existing connections with researchers related to this project. As mentioned earlier, not many ECUs had made use of EPs at the beginning of the study. In 2003 therefore, we contacted the newly founded SOSG (Stichting Opleiding Spoedeisende Geneeskunde), whose members all employed EPs. Through the SOSG we got into

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8 Please note that non-teaching hospitals are not necessarily completely resident-free: Some teaching-hospitals cooperate with non-teaching hospitals for resident internships. However, medical education is not the primary process for non-teaching hospitals.

9 Findings of the pilot study are presented by van Offenbeek et al. (2002; 2005) and van Offenbeek (2004).
3. Design of the Study and Case Selection

Contact with two other suitable cases. An additional three potentially suitable cases were directly contacted in written form by the researcher and the co-promoter. In all cases, a first meeting was arranged with the researcher-in some cases accompanied by the co-promoter- and ECU officials, sometimes hospital managers. In these meetings we first explained the aim and intention of the study, then asked questions to evaluate the suitability of the case. If suitable, hospital officials were asked whether they would be willing to participate. Once the cases declared their cooperation, the details of data collection were discussed and scheduled. Five out of the seven selected cases are located in the North of The Netherlands. While this decision was deliberately taken due to travel time, the three small hospitals have been pointed out as ‘the best’ in the Netherlands (ANP 2006), which heightens their comparability and relevance. Two cases, however, were selected in the South of Holland providing also some regional variation.

Table 3.1: Case selection

<table>
<thead>
<tr>
<th>EPs are used</th>
<th>Large teaching hospitals</th>
<th>Small non-teaching hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced transition</td>
<td>+EP_L_ADV</td>
<td>+EP_S_ADV</td>
</tr>
<tr>
<td>Early transition</td>
<td>+EP_L_EAR</td>
<td>+EP_S_EAR</td>
</tr>
<tr>
<td>EPs are not used</td>
<td>-EP_L(I)</td>
<td>-EP_S</td>
</tr>
<tr>
<td></td>
<td>-EP_L(II)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.1 introduces the codes that will subsequently be used to refer to each case. The codes are composed as follows: +EP/-EP indicates whether or not EPs are used. It is followed by an indication about the size and teaching status of the case: L stands for large teaching hospitals, S for small non-teaching hospitals. The last part of the code refers to the transition stage: ADV means the case is in advanced transition towards a completely EP-based work system, EAR indicates early transition (this part of the code is only applicable for cases +EP). The two large teaching hospitals without EPs are distinguished by adding (I) and (II).